A METHOD FOR ANALYSIS OF GAMAKA IN ALPANA*

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Introduction

Ancient Sanskrit and Telugu texts define and describe *gamaka* in aesthetic terms close to the tradition of Indian poetry and the concept of Karnatak music. This study attempts to analyze the *gamaka* in *alapana* as presently performed using a quantitative method. Admittedly this is not necessary or relevant to aesthetic appreciation of Karnatak music. However, as a teacher of Karnatak music in an American academic situation, from the view point of research I decided to apply a western derived method to traditional performance. This method made it possible to see how the *gamaka* is important in *alapana* and its association with certain tones of the *raga*. It was then possible to see the individuality revealed by performers within certain *raga* features held by the tradition in common.

Aim of the Study

The study reported here makes an explicit visual and quantitative classification of the various shapes of *gamakas* in selected recorded performances of three *ragas*. The analysis is essentially quantitative, based on data from nine performances. It is restricted to tabulations of tones and of classified forms of *gamakas* in order to be as objective as possible. The purposes of this study are: first to transcribe *alapanas* displaying the ornamentation of the melodic line, and then using these transcriptions, to analyze the kinds and uses of *gamakas* in the selected performances. The analysis is concerned with the classification of kinds of *gamakas*, the similarity or difference of the kinds of *gamakas* employed by several musicians performing an *alapana* on three different *ragas*.

Three representative recorded performances of *alapana* in each of three

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* Adapted from *Gamaka in Alpana Performance in Karnatic Music* by Gayathri Rajapur Kassebaum, M.A. thesis University of Hawai 1975.

ragas were transcribed, the varieties of *gamakas* used classified, their distribution and association with tones tabulated, and these data compared to seek to delineate associations of *gamaka* with *raga*. Only one of the nine performances will be presented here. The primary emphasis of this paper is on the method of analysis.

Gamaka

Gamaka is an essential aspect of Karnatak music. Its importance is stressed in many of the older texts and reconfirmed in recent studies. In older treatises on Indian music, considerable attention was devoted to the concept of *gamaka* in which music without *gamaka* was compared, among other things, to a moonless sky, a waterless pond, and a flowerless vine. *Gamakas* have been variously classified into groups ranging in number from six to twenty two. Of these, two classification schemes, *panchadasa* (15 *gamakas*) and *dashvidha* (10 *gamakas*) are the most widely known. In these, certain groupings are assigned names and in some cases symbols. For purposes of this study these classification schemes are not adequate because the criteria for classification and the level of specificity vary within each system, and because not all *gamakas* are classified or classifiable within them.[1]

Gamaka, in the broad meaning of ornamentation, includes controlled 'shaking', articulating, sliding, and other manipulating of tones by the voice (or instrument) within the *raga* idiom. The tone of certain *svaras* is not conceived separately from the *gamaka*. In fact, in some *ragas*, it is the *svara* (including its integrally associated *gamaka*) that differentiates between two or more *ragas* whose scales are the same. Yet there are considerable differences in individual styles of singing and playing. How many shakes and what tones are held vary from one performer to another. But how much and to what degree? It is necessary to go beyond such general statements for a better understanding of *gamaka* in *alapana*. That is the aim of the present study.

Choice of Material for Study

The focus of the study is on ornaments used in *alapana* in the Karnatak tradition. For such a study to yield valid results, it is essential that the music examined be representative of the tradition. Therefore, more important than the choice of any particular *raga* from the very large number comprising the South Indian system, is the selection of performances by musicians of acknowledged authority and ability. The primary consideration was to obtain nine authoritative performances, three in each of three *ragas*. It was decided to select performances already recorded to assure that no performance was done to illustrate a hypothesis, but rather had been performed in another context. Insofar as possible, performances on readily available commercial discs were selected to enable readers of this study easy access to the sources of data. Finally, an important though secondary consideration, was that the recordings be of sufficient technological quality for tones, pitches, and ornaments to be accurately determined.

The corpus for the larger study consisted of nine *alapanas*, three in each of three *ragas*. Among the available commercial recordings, it was not possible to obtain a recording of an *alapana* in the same three *ragas* by the same three performers. The musicians represented, listed alphabetically according to the name by which they are most frequently called, together with the *ragas* of their performances are:

Performer	*Raga I* *Shankarabharana*	*Raga II* *Purvikalyani*	*Raga III* *Madyamavadi*
Ariyakudi Ramanuja Iyengar		X	
D.K. Pattammal			X
Ramnad Krishnan			X
Semmangudi Srinivasa Iyer	X	X	
M.S. Subbulakshmi	X	X	X
T. Viswanathan	X		

Method of Transcription

Disc recordings were dubbed onto tape at 7.5 inches per second on a TEAC Model 1500 tape deck, or in some cases a Revox A-77. One or the other of these two machines were used for playback in the process of transcribing the principal melodic line. Because the intention of the study is to analyze the principal performer's part (not the total ensemble performance or the relationship of the principal performer to the accompaniment) the accompanying parts are not transcribed.

The melodic line was transcribed on graph paper by hand as perceived by ear. The Indian solfége was supplied alongwith the graphic representation. The text syllables used for melodic articulation were transcribed as heard. The graphic line can be read by itself without reference to the Indian solfége written below it. Similarly, the Indian solfége can be read independently of the graphic line (and may facilitate following the line by readers more accustomed to Indian notation).

The first step was to write (*i.e.* draw) the basic melodic line along with the solfége and articulation syllables. Next the tape was replayed and each *gamaka* was carefully and repeatedly listened to using both normal (7.5 ips) and half (3.75 ips) speeds. The latter, slower speed permitted more accurate classification of the ornaments, for at normal performing speed each phrase and *gamaka* occurs at a faster rate than the ear can retain while the mind analyzes for a high level of specificity and calculates the graphic representation. Repeated replaying and listening is necessary, and continual checking essential to this process.

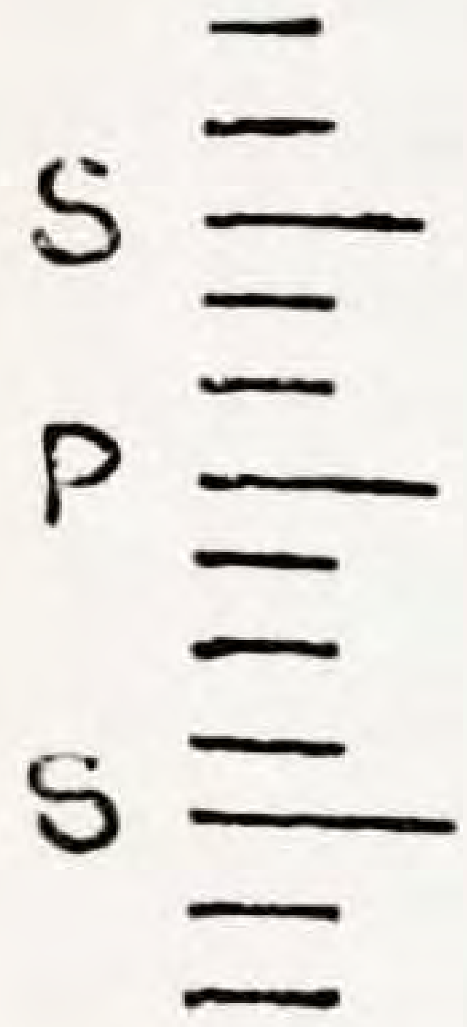
Each *gamaka* was transcribed using Indian solfége notation. After hearing the recorded extract several times, it was useful to sing each *gamaka* to facilitate understanding of its exact 'shape' before writing it on paper. This is a time-consuming process if *gamakas* are to be accurately presented. A musical example of only a few minutes' duration may contain hundreds of tones and *gamakas*, so it takes many hours to transcribe.

Of the syllables used for articulation, the majority were heard as containing low central 'a'. Other vowels were heard as high front 'e' and diphthong 'au'. Among the consonants, dental nasal 'n' is predominant. Other consonants were heard as voiceless dental 't', semi-vowel 'y', voiced unaspirated dental 'd', and semi-vowel 'i'. The syllable inventory includes 'a', 'n', 'na', 'ra', 'ta', 'la', 'no', 'wo', 'aw', 'now', and 'yi'. Combinations of these, such as 'ran, 'tana', 'tara', 'tadari', and 'tarata' are used to punctuate the melodic phrases and style of using such syllables to help reveal the essentials of *ragas*. The performer displays the skill of vocal or instrumental techniques through these sounds. In the flute performance in the corpus, the articulations have been transcribed as syllables corresponding to vocal performances (although the performer might have made a different choice of syllables if he had been singing).

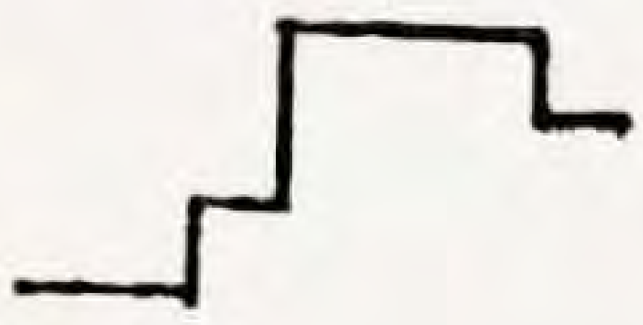
In the graphs, the melody of the principal performer is transcribed; the accompanist's playing (simultaneous and interspersed) is not. The duration of each 'silence' (i.e. silence in the principal performer's part; tone is being produced in the accompanist's part) is shown as empty space on the graph. In addition to 'silence' between phrases (during which, of course, breath is taken) there are some instances of very quick breath-taking (catch breaths) within a single melodic unit. It was not possible to stop the watch and restart it within such a brief time. On the graph this is shown as a discontinuity in the line but with virtually no empty space. (See Fig. A).

FIGURE A

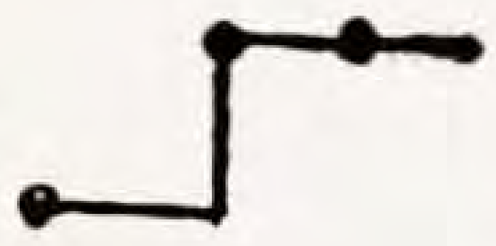
Key to Graph and Special Symbols



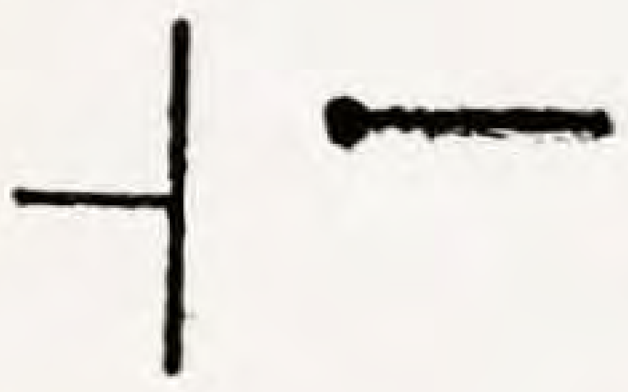
Staff. Height accommodates pitch range employed. Sa and Pa identified by longer lines and solfége. Number of lines between Sa and Pa accommodates *svaras* of *raga*. (Right and left margins.)



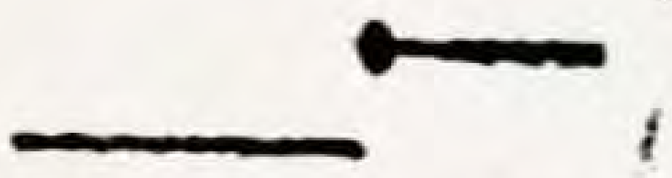
Melodic line. Pitch on vertical axis; duration on horizontal axis, 1/2 inch 1 second.



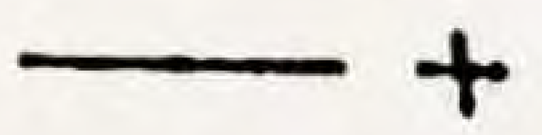
Syllable articulation (at beginning and within pitch).



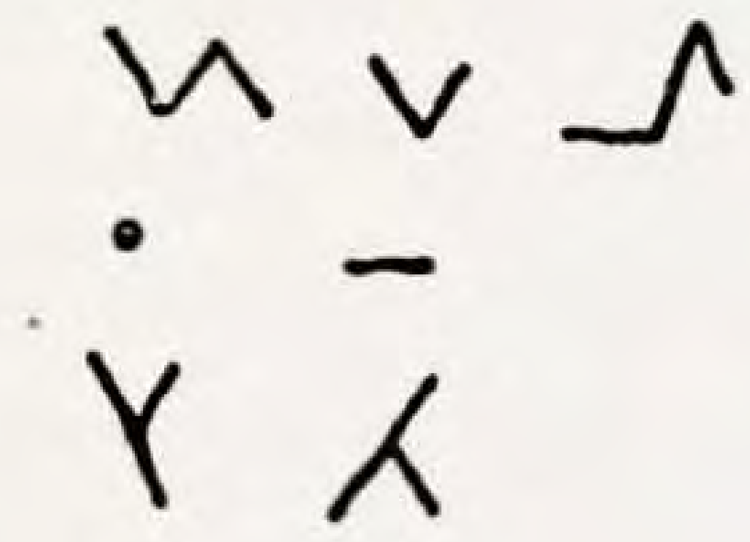
Phrase ending; 'silence'; beginning of new phrase.



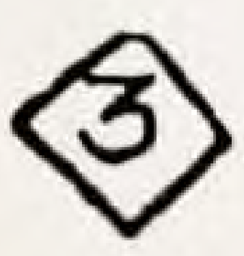
Short breath within phrase.



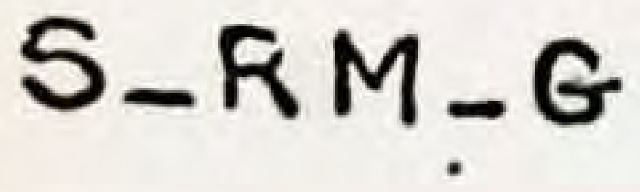
Continuation of phrase to next score. (Right margin.)



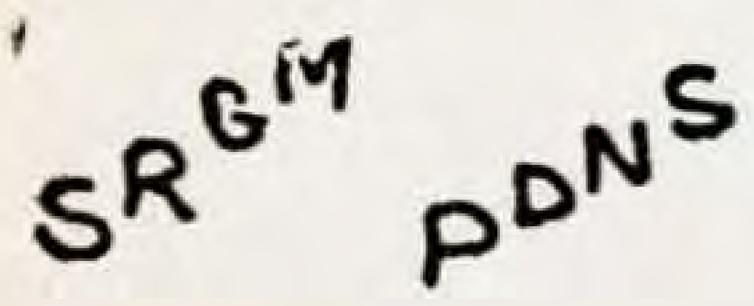
Gamakas, accents, stylistics. Types A, D, E, G above melodic line; types B, C, F, H, I below melodic line. (See Figure 3.1 for complete symbol display.)



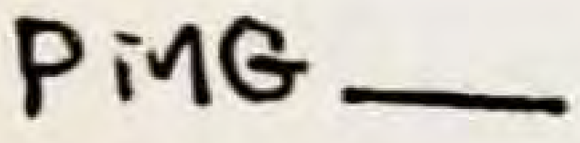
Phrase number



Melodic line in solfége.



Solfege stacked to conserve space.



Continuation of phrase to next score. (Right margin.)

Symbols Representing Gamaka

The writer classifies *gamaka* into types and subtypes by a consistent (and admittedly arbitrary) approach to shape. The shapes are symbolized for graphic representation and coded for quantification and comparison. The graphic symbols and alphameric code were specifically developed for the inventory of *gamakas* found in this corpus of nine performances in three *ragas—Shankarabharana, Purvikalyani*, and *Madhyamavati*. However, the principles underlying the symbols and code are systematic and in the future could be adapted to a larger inventory which undoubtedly would be found in a larger corpus of performances by other performers and in other *ragas*. It should be noted here that the level of specificity of pitch designations is that of the solfège tones. A future study, perhaps with machine transcription, might analyze pitch in the cent system and compare results with the 22-*sruti* microtone system.

In preliminary analysis of the corpus selections, attention was focussed on ornamentation involving prominent use of more than one pitch—i.e. ornamentation that is almost invariably called '*gamaka*' by musicians and scholars. It was found that many kinds (shapes) of these could be classified into four types based on the direction of initial pitch movement in relation to the principal pitch. These are assigned code designations tupe-A through type-D[2]. In type-A the initial movement is a slide from a higher tone down to the principal tone; in type-B from the principal tone down to a lower tone; in type-C from a lower tone up to the principal tone; and type-D from the principal tone up to a higher tone.

Ornamentation involving special vocalization within one tone occurrence (*i.e.*, within the duration of a single tone) is also essential to Karnatak style and is embraced within the broad concept of *gamaka*. When differentiating between ornamentation involving prominent use of more than one pitch and that involving ornamentation within a single tone, the former is referred to as '*gamaka*' and the latter as 'accent'. Two types of accents were found in the corpus: a glottal in singing (or comparable stop in playing an instrument), and an articulation produced deep in the thoat. These are assigned code designations type-E and type-F respectively.

In refining and finalizing the transcriptions, it was decided that rapid sliding in pitch joining one tone to the next (suggesting a *gamaka* in the restricted meaning of the word but shorter in duration) should be included in this study because such ornamentation seems significant to the style and is embraced within the broad concept of *gamaka*. When differentiating a rapid slide from the other types mentioned above it is referred to as 'stylistic'. Although four types of stylistics would seem to be possible (one corresponding in contour to each of types A through D), only three were found in the corpus. They are assigned code designations type-G through type-I. Type-G corresponds in shape to the *gamaka* Aal, type-H to the *gamaka* Cal, and type-I (with only one occurrence in all nine performances) to the *gamaka* Bal.

The decision to classify each instance of sliding pitch as a major type *gamaka* (type-A through type-D) or as a stylistic has been determined by the writer's judgment.

Alphmeric Code and Graphic Symbols

The 60 kinds of ornaments used in the nine performances studied are displayed in Figure B. The first digit (capital letter) is placed in the column on the left. Accents and stylistics have only this one digit because these ornaments have no subtypes or varieties (within the level of specificity of this study). The second digit (lower case letter) which indicates *gamaks* subtypes is placed in the column immediately to the right. The subtypes are variants of the basic shape.

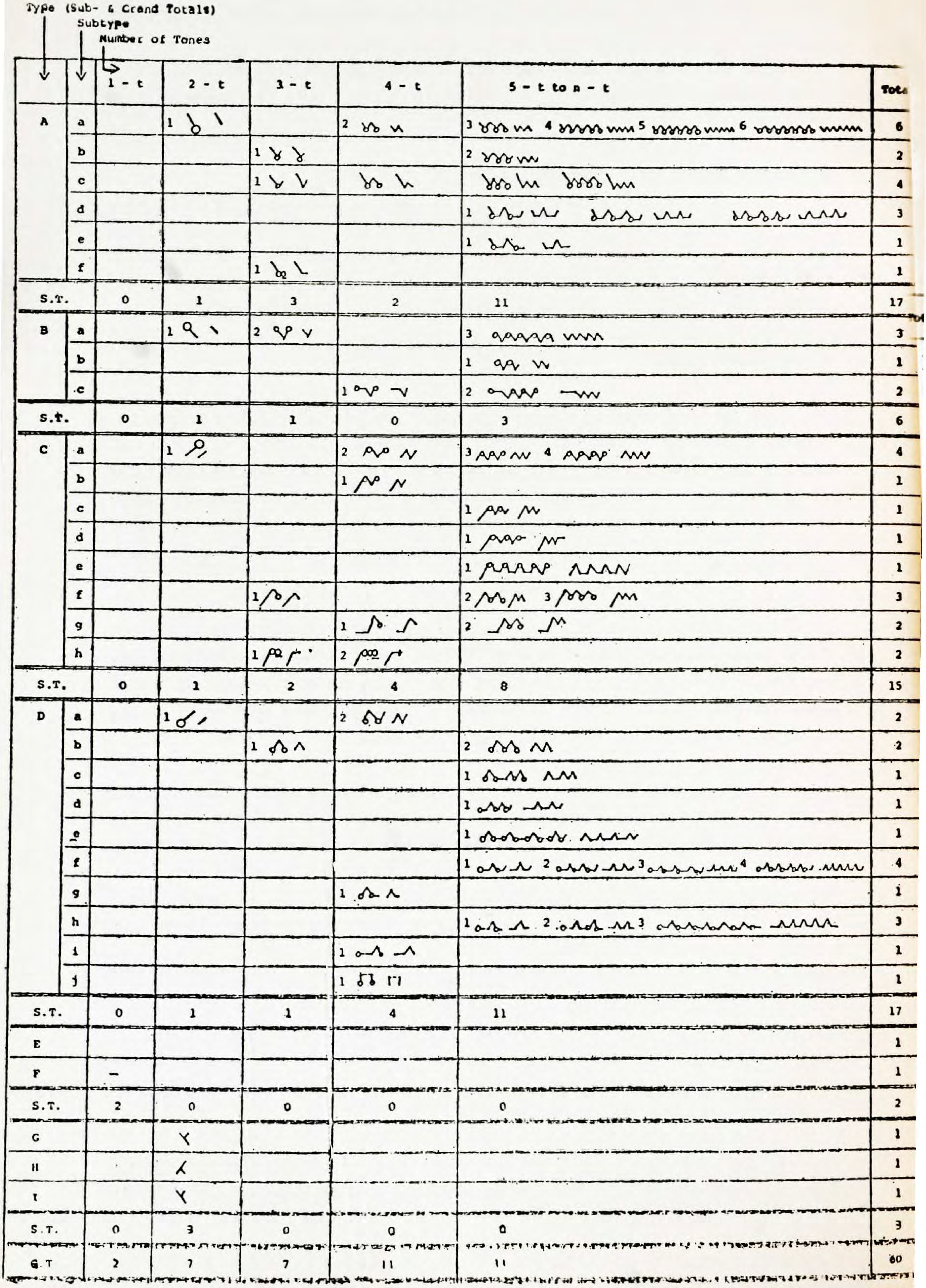
The five columns to the right provide cells for displaying ornaments involving different numbers of tone occurrences. To conserve space, all *gamakas* with five or more tone occurrences are placed in the same cells; for those with more than five tones the number of tones is shown directly above the symbol. Accents involve only one tone. Stylistics and the first variety of *gamaka* subtypes involve two tones. Other varieties involve two or three tones and from three to 17 tone occurrences.

The third digit (numeral) of the *gamaka* code is placed towards the left in the cell of the appropriate number of the tone occurrences and the symbol to its right. In the column on the far right is shown the total number of varieties of each *gamaka* subtype. Subtotals according to the number of tones involved are shown below the display of each *gamaka* type.

A pair of graphic symbols is presented for each *gamaka*. The symbol on the left is a 'drawing' of the shape of movement with a circle indicating the pitch level of the principal tone. This kind of symbol was helpful in organizing the many subtypes and varieties into a consistent system based on shape. On the right is the symbol as it appears in the transcriptions. In this simpler form, some symbols (*e.g.* Aal and Bal) look alike, however the missing information on relationship of pitch movement to principal tone is conveyed in the transcriptions by placement above or below the melodic line (*e.g.* Aal above, Bal below). In the left column of Figure B, the placement on the graphic transcription of each ornament is shown. Each capital letter is place above or below a short line representing a segment of the melodic line (*e.g.* *A* shows that all type-A *gamaka* are placed above the melodic line, and B that all type-B *gamakas* are place below the line).

To illustrate the method, a transcription of one performance and the data representation of that performance through tables is presented. **(Fig. B)**

FIGURE B



Type (Sub- & Grand Totals)
Subtype
Number of Tones

		1 - t	2 - t	3 - t	4 - t	5 - t to n - t	Tot
A	a		1		2	3 4 5 6	6
	b			1		2	2
	c			1			4
	d					1	3
	e					1	1
	f			1			1
S.T.		0	1	3	2	11	17
B	a		1	2		3	3
	b					1	1
	c				1	2	2
S.T.		0	1	1	0	3	6
C	a		1		2	3 4	4
	b				1		1
	c					1	1
	d					1	1
	e					1	1
	f			1		2 3	3
	g				1	2	2
	h			1	2		2
S.T.		0	1	2	4	8	15
D	a		1		2		2
	b			1		2	2
	c					1	1
	d					1	1
	e					1	1
	f					1 2 3 4	4
	g				1		1
	h					1 2 3	3
	i				1		1
	j				1		1
S.T.		0	1	1	4	11	17
E							1
F		—					1
S.T.		2	0	0	0	0	2
G							1
H							1
I							1
S.T.		0	3	0	0	0	3
G.T		2	7	7	11	11	60

The performance selected for analysis is a 5 minute 3.3 second extract of *alapana* before the *kriti* "*Saroja dala netri*" in *raga Shankarabharana tala Adi*, composed by Syama Sastri and performed by M.S. Subbulakshmi. This example appears on the recording CLASSICAL INDIAN MUSIC, Parlophone PMAE 501 (reissued Odean, MOAE 147).

Description of the Tables

In the first table the numerals in parentheses indicate frequency of occurrences; the numerals without parentheses indicate percentages to the closest whole percent. For example, Table 1 shows that in *raga Shankarabharana* performed by M.S. Subbulakshmi, a total of (793) tones were sung. Of these, (122) were Sa, (131) were Ri, and so on through the scale. Starting from the column on the left, the table shows that of the occurrences of Sa, (25) or 20% had a *gamaka*, (2) or 2% had an accent, (29) or 24% had a stylistic; and none had a double ornament. The next two columns show that of the occurrences of Sa, (56) or 46% had some kind of ornament, and (66) or 54 had no ornament of any kind. The table shows the comparable information for each tone in the *raga*, and on the bottom line, for the total of all tones.

The second table shows the joint distribution of tones and *gamakas*. It is called a joint distribution because each tone is jointly classified as to name of tone (Sa, Ri, etc.) and type of ornament (Aa1, Aa2, etc.). Of the total inventory of ornaments in the nine performances, only those (including double ornaments) that occur at least once in the performance of *Shankarabharana* by M.S. Subbalakshmi are listed in the table. The numerals are of frequency of occurrence, except those in the column on the far right that are the sum of each ornament type expressed as a percentage of all ornamented tones in the performance. For example, Table 2 shows that in *raga* I, Performance 1 there are 154 occurrences of *gamaka* type Aa1, of which 12 are Sa, 68 on Ri, 8 on Ga, and so on through the scale. The 154 *gamaka* type Aa1 comprise 26% of all ornamented tones in this performance.

The third table shows distribution of held tones. In this study, tones whose duration is one second or longer are designated 'held' tones. Although holding a tone is not ornamentation, the long duration in comparison to others gives it special prominence, so that its treatment—whether ornamented or not—contributes greatly to the total impression of the *raga* being performed. In considering held tones, range (register) is important, so the table displays occurrences of held tones in relation to low range below middle Sa), middle range (middle Sa through middle Ni), and high range (high Sa and above), In Table 3 it can be seen that of the 793 tones 4% are held tones. Of these, none are in low range (in this performance low Pa through low Ni); 11 unornamented and 2 ornamented in middle range; and 11 unornamented in high range (in this performance high Sa through high Pa).

TABLE 1

Percentage Distribution of Tones and Gamakas :
Raga I, Performer 1

Tones	Tones w/ Gamaka		Tones w/ Accent		Tones w/ Stylistic		Tones w/ Double Ornaments		Total Tones w/ Ornaments		Total Tones w/o Ornaments		All Tones	Base for Percent
Sa	(25)	20	(2)	2	(29)	24			(56)	46	(66)	54	100%	(122)
Ri	(88)	67	(2)	2	(29)	22	(2)	1	(121)	92	(10)	8	100%	(131)
Ga	(26)	16	(2)	1	(91)	56	(2)	1	(121)	74	(43)	26	100%	(164)
Ma	(59)	39	(1)	1	(61)	41	(5)	3	(126)	84	(24)	16	100%	(150)
Pa	(23)	22	(1)	1	(28)	26	(5)	5	(57)	54	(48)	46	100%	(105)
Da	(32)	70	(3)	6	(7)	15	(4)	9	(46)	100			100%	(46)
Ni	(48)	64			(16)	21	(2)	3	(66)	88	(9)	12	100%	(75)
Total	(301)	38	(11)	1	(261)	33	(20)	2	(593)	74	(200)	26	100%	(793)

Table 2

Joint Distribution of Tones and Gamakas:
Rāga I, Performer 1

Gamaka Type		Sa	Ri	Ga	Ma	Pa	Da	Ni	Sum of Type	%
Aa1	╲	12	68	8	4	4	12	46	154	26.0
a2	╲╱╲		4		2		1		7	1.2
b1	γ						7		7	1.2
f1	╲_	7			5	2			14	2.4
Ba1	╲			2					2	.3
a2	∨				3				3	.5
Ca1	╱	6	10	9	27	14	3		69	11.6
a2	╱╲╱				5				5	.8
f1	╱╲		3		7		6	2	18	3.0
f2	╱╲╱╲╱╲				1				1	.2
h1	╱‾				3	2			5	.8
Da1	╱			7	1	1	1		10	1.6
a2	╱╲╱		3		1				4	.6
b1	ʌ						2		2	.3
Gamaka Total		25	88	26	59	23	32	48	301	50.8
E	·		2	2	1	1	1		7	1.2
F	_	2					2		4	6

(Continued on next page)

Table 2 (Continued)

Joint Distribution of Tones and Gamakas: Rāga I, Performer 1

Gamaka Type	Sa	Ri	Ga	Ma	Pa	Da	Ni	Sum of Type	%
Accent Total	2	2	2	1	1	3		11	1.9
G ɣ	20	22	46	26	12	2	14	142	23.9
H ʎ	9	7	45	35	16	5	2	119	20.1
Stylistic Total	29	29	91	61	28	7	16	261	44.0
Double Ornaments		2	2	5	5	4	2	20	3.3
Grand Total	56	121	121	126	57	46	66	593	100.0

Table 3 shows that of the total 793 tones, 4 are held tones. The held tones are Sa, Ga, Ma, and Pa. The tone Sa is found in both middle and high range; Ga in high range only. Among the held tones, Sa has the highest percentage with (9%), next are tones Ga and Pa with (6%), and tone Ma (less than 1%).

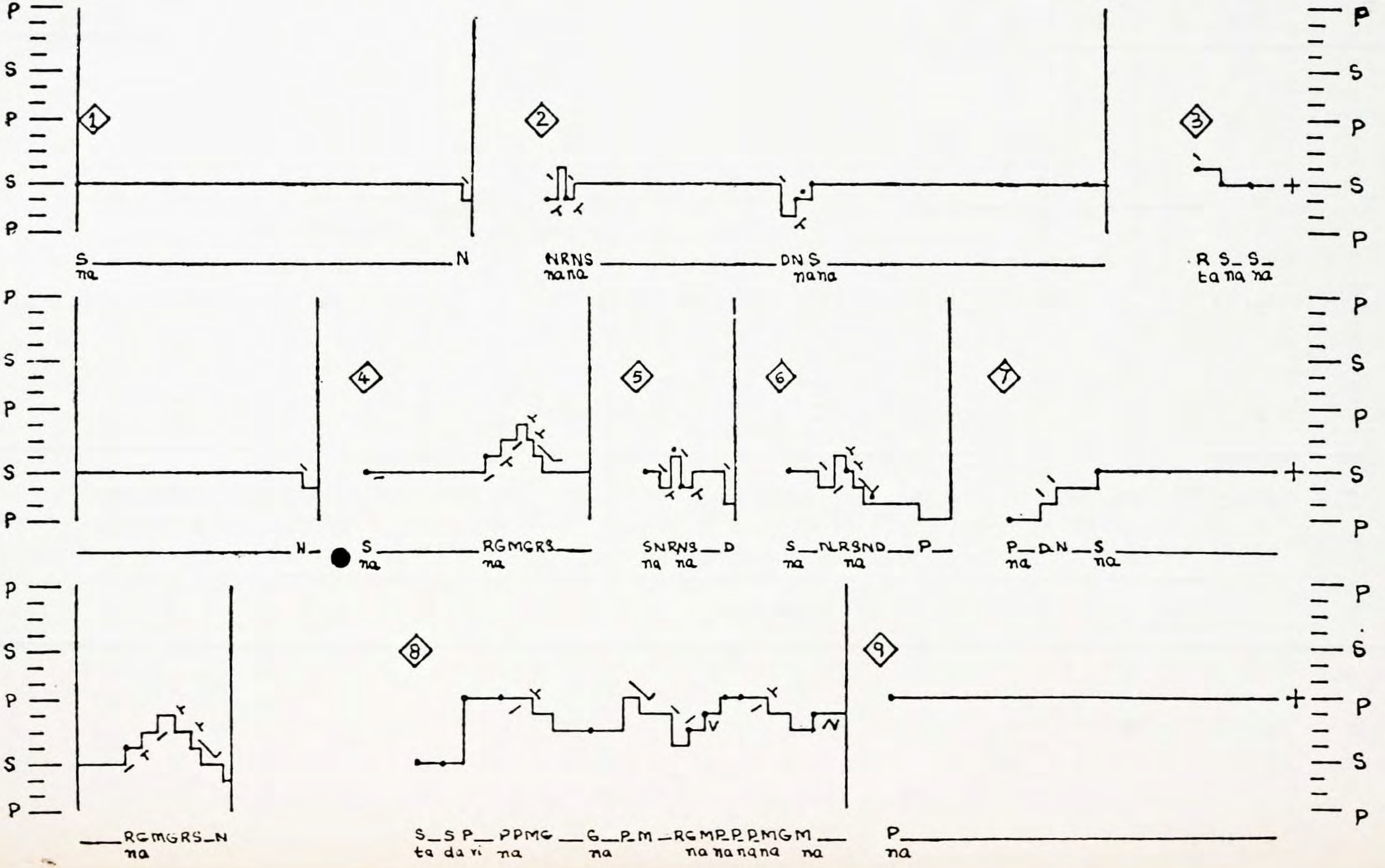
TABLE 3

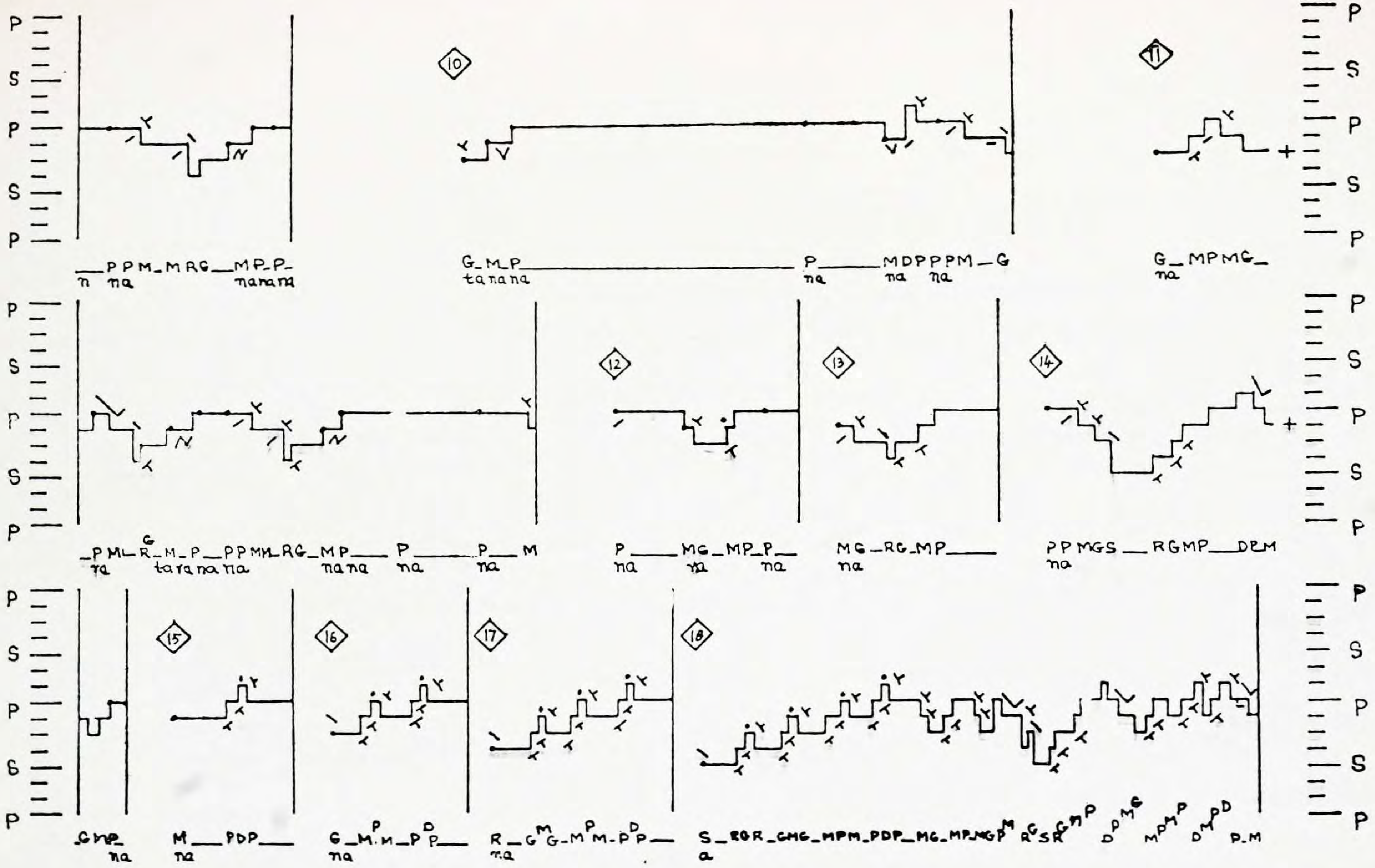
Distribution of Held Tones
Raga I, Performer 1

		Range							
		Low		Middle		High			
Tone	Frequency of Tones	Unornamented	Ornamented	Unornamented	Ornamented	Unornamented	Ornamented	Total	%
Sa	122			4	2	4	1	11	9
Ri	131								
Ga	164					7	3	10	6
Ma	150			1				1	1
Pa	105			6				6	6
Da	46								
Ni	75								
Total	793			11	2	11	4	28	4

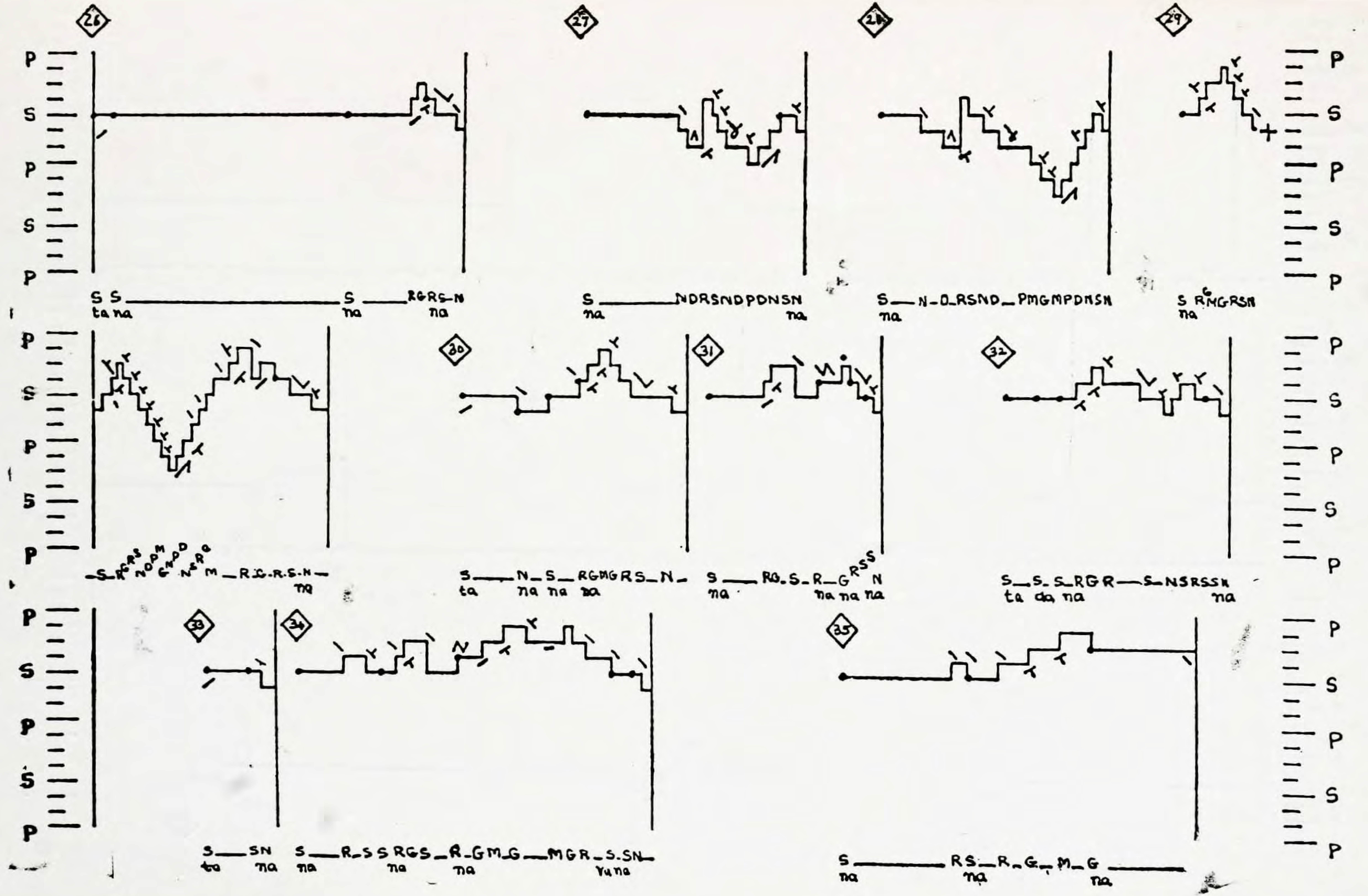
Raga Shankarābharana

Performed by M.S. Subbulakshmi




P
S
P
S
P
__PPM_MRG__MP_P_
n na narana
10
G_M_P________P____MDPPPM_G
tanana na na na
11
G_MPMG_
na
+
_PML R_M_P_PPMMRG_MP___P____P__M
G
ra tarananana nana na na
12
P___MG_MP_P_
na na na
13
MG_RG_MP___
na
14
PPMGS__RGMP__DPM
na
+
GMP_
na
15
M__PDP__
na
16
G_M M_P P__
P D
na
17
R_G G_M M_P P_
M P D
na
18
S_RGR_GMG_MPM_PDP_MG_MPMGP RGSR GMP DPMG MPMP DMPD P_M
a

P
S
P
S
P
19
20
21
G_M_P___P___M__P_DNDNDP__M
ta da na na na na
M____PDP_DPPMMG
na na
MP__D-P-M-G
na na
22
23
M_P__DP_MGPM_R-G-M-P_DG M_P___M
na na na na na
PPM_G_M_P_D_N_S_RSND__P_M D P M G M_
na na na na na na na
24
25
M_P__D_N_S__S_RNS___D_S_P_
na na na na
D__NS___ NDPM G RPD NSRS N
na na na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27
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30
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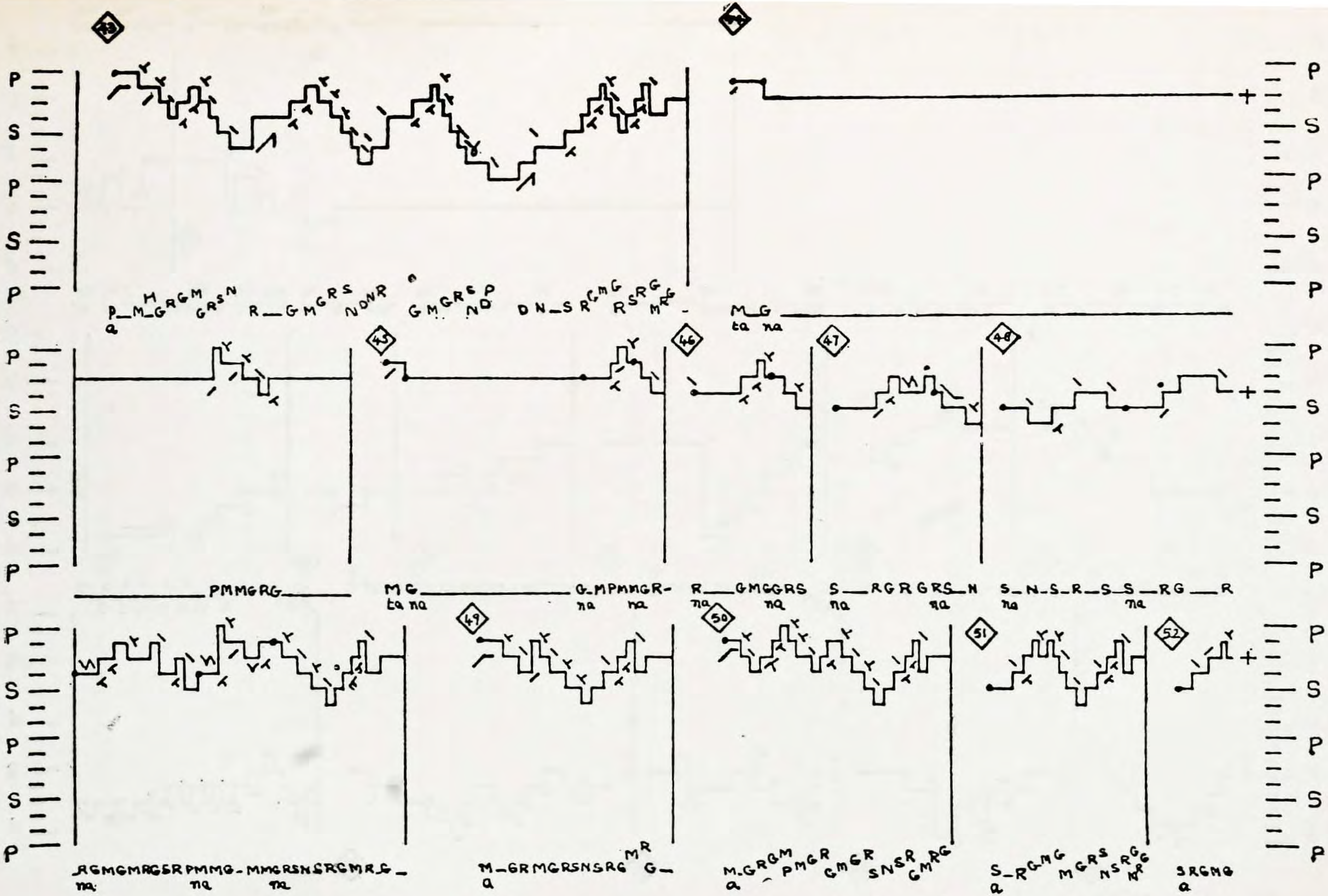
32
33
34
35
P
S
P
S
P
S S ta na
S na
RGRS-N na
S na
NDRSNDPDNSN na
S na
N-D-RSND-PMGMPDNSN
S RNGRSN na
S R G R S N D P M G N D P N S R G M R G R S N na
S ta
N na
S na
RGMGRS-N- na
S na
RG-S-R na
G na
R S S N na
S-S-S-RGR-S-NSRSSN
ta da na
na
S ta
SN na
S na
R-SSRGS na
R-GM-G na
MGR-S.SN- ru na
S na
RS na
R-G-M-G na

36
37
P
S
P
S
P
+
M_G
ta na
MMGGRRS RGMR___G__
na
M_G
ta na
38
39
40
G
na
MGRSRGRGRSR_G__M__R_G_R_
na na na
GRG__MGRS
na
M__GRSNSRGM_R_G
a
M__G
ta na
41
42
N
PMMGRG
M G
ta na
G
na
MGR.S N R.G MR G
P-MMG
na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S
P
S
P
P_M_GRGM GRSN R_GMGRS NDNR GMGRSP ND DN_SRGMG RSRG MRG -
a
M_G
ta na
45
46
47
48
PMMGRG
MG
ta na
G_MPMMGR-
na na
R_GMGGRS
na na
S_RGRGRS_N
na na
S_N_S_R_S_S_RG_R
na na
49
50
51
52
RGMGMRGSRPMMG-MMGRSNSRGMRG_
na na na
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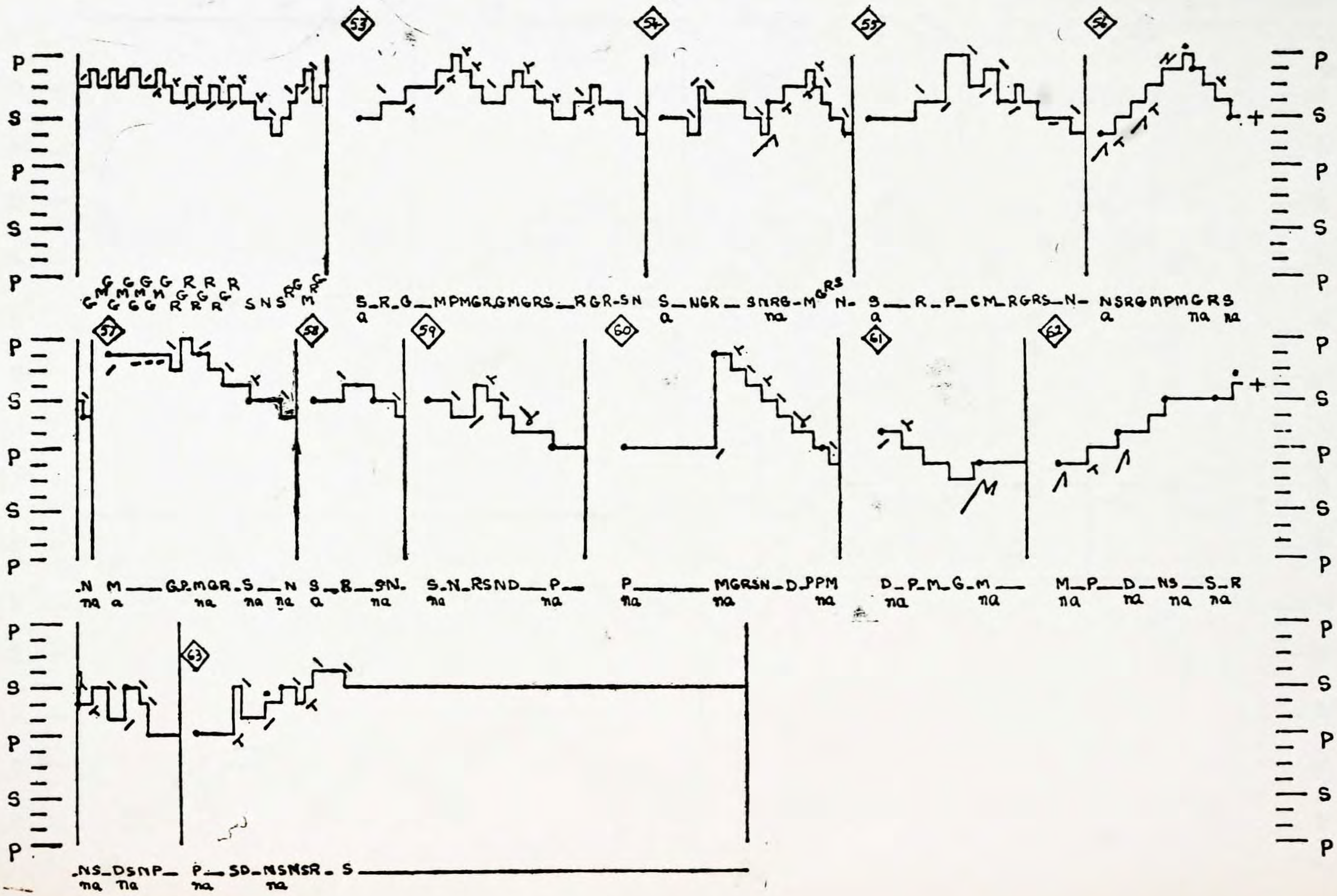
a
S_RGMG MGRS NSRG NR
a
SRGMG
a
+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62
63
P
S
P
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P
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a
S_NGR_SNRG-M GRS N-
na
S_R_P_GM_RGRS_N-
a
NSRGMPMGRS
a na na
.N M_GP.MGR_S_N S_S_SN.
na a na na na a na
S_N_RSND_P_
na na
P_MGRSN_D_PPM
na na na
D_P_M_G_M_
na na
M_P_D_NS_S_R
na na na na
.NS_DSNP_ P_SD_NSNSR_S
na na na na
+

Analysis of Raga Shankarabharana performed by M.S. Subbulakshmi

The total duration of the performance as it appears on the transcription is 308.6 seconds, of which the soloist occupies 254.4 seconds. Silence in the soloist's part, during which the accompaniment continues, occupies 54.2 seconds. There are 63 phrases in total. The range of this performance is from low Pa to high Pa (two octaves). This performance starts on middle Sa and ends on high Sa.

The performer, M.S. Subbulakshmi, uses 18 types of ornaments, including *gamakas*, accents and stylistics, and some double ornaments (*i.e.,* two *gamakas* on one tone). Four type-A *gamakas* are used.

Aal is used on all seven tones Sa, Ri, Ga, Ma, Pa, Da, and Ni.

The interval size is:

	RS	GR	MG	PM	DN	ND		SN
2nd on	S—,	R—,	M—,	G—,	P—,	D—,	and	N—;
	GS	MR	PG	DM	NP		SD	
3rd on	S—,	R—,	G—,	M—,	P,	and	D—;	
	PR	DG		SP				
4th on	R—,	G—,	and	P—;				
	PS							
5th on	S—.							

Aa2 is used on tones Ri, Ma, and Da. The interval size is:

	GRGR		NDND
2nd (x2) on	R—	and	D—;
	PGPG		
3rd (x2) on	M—.		

Abl is used on tone Da only. The interval size is:

	SDN
3rd and 2nd on	D—.

Afl is used on tones Sa, Ma, and Pa. The interval size is:

	RSS	PMM		DPP
2nd and prime on	Rs—,	PM—,	and	DP—.

Two type-B *gamakas* are used.

Ba1 is used on tone Ga only. The interval size is:

	GR
2nd on	G—;
	GS
3rd on	G—.

Ba2 is used on tone Ma only. The interval size is:

	MGM
2nd on	M—,

Five type-C *gamakas* are used.

Ca1 is used on six tones Sa, Ri, Ga, Ma, Pa, and Da. The interval size is:

	NS	SR	RG		MP		
2nd on	S—,	R—,	G—,	M—,	and	P—;	
	DS	NR	SG	RM	GP		MD
3rd on	S—,	R—,	G—,	M—,	P	and	D—;
	PS	DR	SM		RP		
4th on	S—,	R—,	M—,	and	P—.		

Ca2 is used on tone Ma only. The interval size is:

	GMGM
2nd (x2) on	M—.

Cf1 is used on tones Ri, Ma, Da, and Ni. The interval size is:

	SGR	GPM	PND		DSN
3rd and 2nd on	R—,	M—,	D—,	and	N—;
	PSD				
4th and 3rd on	D—;				
	PSN				
4th and 2nd on	N—.				

Cf2 is used on tone Ma only. The interval size is:

	GPMPM
3rd and 2nd (x2) on	M—.

Ch1 is used on tones Ma and Pa. The interval size is:

	SMM
4th and prime on	M—;
	SPP
5th and prime on	P—.

Three type—D *gamakas* are used.

Da1 is used on tones Ga, Ma, Pa, and Da. The interval size is:

	GM	MP	PD		DN
2nd on	G—,	M—,	P—,	and	D—.

Da2 is used on tones Ri and Ma. The interval size is:

	SRSR		MPMP
2nd (x2) on	R—	and	M—.

Db 1 is used on tone Da only. The interval size is:

	DND
2nd on	D—.

Accent—E is used on tones Ri, Ga, Ma, Pa, and Da.

Accent—F is used on tones Sa and Da.

Stylistic—G is used on all seven tones Sa, Ri, Ga, Ma, Pa, Da, and Ni.

The interval size is:

	RS	GR	MG	PM	DP	ND		SN
2nd on	S—,	R—,	G—,	M—,	P—,	D—,	and	N—;
	DM							
3rd on	M—.							

Stylistic-H is used on all seven tones Sa, Ri, Ga, Ma, Pa, Da, and Ni.

The interval size is :

	NS	SR	RG	GH	MP	PD		DN
2nd on	S—,	R—,	G –,	M—,	P—,	D—,	and	N—;
	NR							
3rd on	R—;							
	DR							
4th on	R—.							

Double ornaments are used on six tones Ri, Ga, Ma, Pa, Pa, and Ni.

Table 4.1 shows that a total of 793 tones were used by the performer, of which 74 % received some kind of ornaments and 26 % had no ornament. Of the 793, 38 % were tones with *gamaka*, 1 % were tones with accent, 33 % were tones with stylistic, and 2 % were tones with double ornament.

The tones Ri and Da are heavily ornamented (92 % Ri and 100 % Da). The tones Sa and Pa are ornamented approximately half of the time (46 % Sa and 54 % Pa). The tones Ga, Ma, and Ni are between these two extremes (74 % Ga, 84 % Ma, and 88 % Ni).

In Table 4.2 it can be seen that types Aal, Cal, and stylistics account for a larger proportion of ornaments than any other types (26 % Aal, 11.6 % Cal, and 44 % stylistics). Some tones receive more of a given *gamaka* than do others. Of the total 154 type Aal, the tones Ri and Ni receive 68 and 46 respectively. Of the total 69 type Cal, the tones Ma and Da receive 27 and 14 respectively. Of the stylistics, tones Ga and Ma receive more than any other tones (91 Ga and 61 Ma).

More varieties of type-A *gamakas* occur on tones Ma and Da than on other tones; more type-C on tone Ma; type-D is spread thinly over several tones (Ri, Ga, Ma, Pa, and Da); and type-B is used rarely on two tones (Ga and Ma). Accent-E is used on more tones (Ri, Ga, Ma, Pa, and Da) than Accent-F (Sa and Da). Both stylistic-G and stylistic-H are used on all seven tones but stylistic-G is used more than H (142 and 119, respectively). Double ornaments are found on all tones except Sa.

Table 4.3 shows that of the total 793 tones, 4 % are held tones. The held tones are Sa, Ga, Ma, and Pa. The tone Sa is found in both middle and high range; Ga in high range only. Among the held tones, Sa has the highest percentage (9 %), next are tones Ga and Pa (6 %), and tone Ma (less than 1 %).

Summary and Conclusion

Alapana performance is an experience for the performer as well as for the listeners. Transformation of this experience into verbal communication is difficult, but is appropriate to the methods of ethnomusicology which attempts objectivity in study about the content and context of music.

The transcription provides both the graphic outline of the melody together with symbols of the ornamentation, and the solfége symbols. These represent visually some of the aesthetic elements of the sound. The visual transcription of the sound gives details of ornaments designated in this study as *gamakas*, accents, and stylistics.

In addition to the visual presentation of *gamakas* in *alapana*, *gamakas* are classified, and coded. The occurrences of each kind are counted and presented in tables which display distributions, totals, and percentages. It is true that the numbers and percentages are not music, and do not reproduce the details of music in experience—they do not pretend to capture experience. But these numbers and percentages display certain features of the music. Many important details of *gamaka* in the *alapana* performances of the corpus are brought out in these tables.

Should objective data and subjective experience be used together? By examining the transcriptions with the *gamaka* symbols placed above and below the melodic line—even without examining the tables—one can see the importance of ornaments in *alapana*. It can be said that an advantage of objective data is that they can be re-examined and analyzed by another person but one's experiences cannot. The utilization of classification, symbols, tables, and percentages facilitates comparisons of one performance with another, and of one *raga* with another. In this writer's opinion, objective data and subjective experience complement one another.

In the performance of an *alapana* the musician reveals the essence of a *raga* through its essentials which include *gamakas* specially associated with certain tones. The musician also exhibits individuality in rendering the *raga*. These traditional beliefs are substantiated by the data presented in this study.

In conclusion, it has been found that certain tones of a *raga* receive more ornamentation than others with those receiving the greater amount corresponding to the traditional belief. It has been found, in agreement with the tradition, that certain tones of a *raga* receive specific *gamakas*, but also that they receive some other *gamakas* and ornamentation. It has been found that the traditional belief that all occurrences of some tones received *gamaka* is only rarely achieved in performance although it is often approached. Further, it has been found that within the norms of the traditional expectations for a *raga*, the performer expresses an individual identity and concept of the *raga*. It may be that this balance between satisfaction of expected treatment and of individual treatment of tones contributes to the high place *alapana* holds in the Karnatak tradition, for it is both the same and new simultaneously.

NOTES

1. For more details see, Sambamoorthy 1963: 133-140.
2. Hereafter the word 'type' when joined by a hyphen to a capital letter (type-A) will refer to the broad categoy including subtypes and varieties. When not followed by a hyphen, the word 'type' follows general usage and is applied to broad types subtypes or varieties. The context should make the referent clear.

R.K. GAYATHRI did her thesis on "Gamaka in Alpana Performance in Karnatic Music" from the University of Hawaij, where she is teaching at present.

Gamaka in Alapana Performance in Karnatic Music is a master's thesis in ethnomusicology, University of Hawaii, 1975 (copyright). The author wishes to acknowledge the extensive assistance and guidance provided by Professor Barbara B. Smith in the thesis research and writing. Drawing of the graphs was done by S.K. Lakshmipathy, M.E., of Bangalore.,